

# ST. LAWRENCE COLUMBIUM

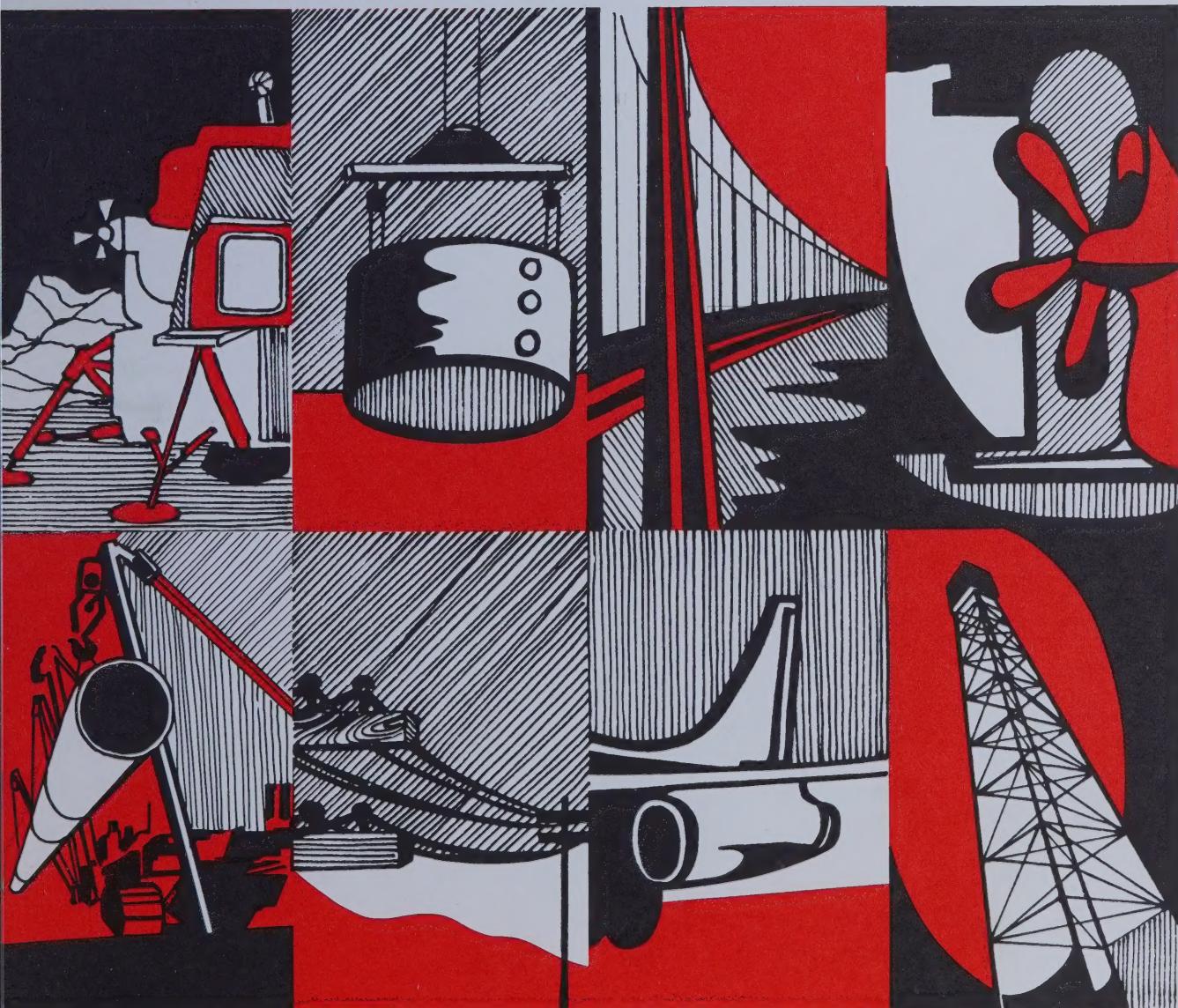
AND METALS CORPORATION

(NO PERSONAL LIABILITY)



AR49

ANNUAL REPORT 1969





# ST. LAWRENCE COLUMBIUM AND METALS CORPORATION

(No Personal Liability)

## OFFICERS :

*President:* Jean-Joffre Gourd, Q.C.

*Executive Vice-President:* J.-Claude Caron, Eng.

*Vice-President and General Counsel:* Jean Monette, Q.C.

*Vice-President - Mining:* Laurent Ferland, Eng.

*Secretary-Treasurer:* Richard Staines, C.A.

## DIRECTORS :

Eugène Defauw, Industrialist, Brussels, Belgium

Wilfrid E. Dodd, Executive, London, England

Michel Fournier, Banque de l'Indochine, Paris, France

Jean-Joffre Gourd, Q.C., Advocate, Montreal

Jean Monette, Q.C., Advocate, Montreal

Peter N. Thomson, Executive, Montreal

J. Emerson Thors, Kuhn, Loeb & Co., Investment Bankers, New York

Henry J. Wolff, Chadbourne, Parke, Whiteside & Wolff, Attorneys, New York

## Transfer Agents:

Canada Permanent Trust Company, Montreal & Toronto

## Bankers:

Canadian Imperial Bank of Commerce, Montreal

## Executive Offices:

Dominion Square Building,  
1010 St. Catherine St. W., Montreal 110, Canada

## Shares Listed:

Canadian Stock Exchange, Montreal

## Mine Office:

Oka, Quebec

## Mine Manager:

André Lachapelle, Eng.



April 1970

#### To the Shareholders:

It is with pride and pleasure that we present the financial statements of your Company, the only producer of columbium concentrates in North America.

The fiscal year ended September 30, 1969 has been a period of strong growth in output, sales and profits. As you will note from the financial statements, revenue from production was \$3,107,514, an increase of 57% over last year's figure of \$1,966,937. Operating profit before depreciation on fixed assets was \$437,580, compared to \$124,169 in 1968. Net profit for the period was \$105,360 against a loss of \$132,342 in the previous year.

To aid increasing future profits through a larger volume of production, the emphasis in the second half of fiscal year 1969 was on bringing the mine to the stage where the Company could take full advantage of a growing world market for its products at improving prices: a third level was opened, underground development work was accelerated and reserves of broken and drilled ore were built up.

These efforts have already proved rewarding, as attested by the results of the first quarter in the 1970 fiscal year. Operating profit of \$250,778 and net profit of \$137,175 after depreciation on fixed assets were obtained from the production of 1,102,814 pounds of  $\text{Cb}_2\text{O}_5$  in the period October 1 to December 31, 1969 valued at \$1,146,191. These results compare with the operating profit of \$73,403 in the first quarter of fiscal year 1969, and net profit of \$8,783 from a production of 666,426 pounds of  $\text{Cb}_2\text{O}_5$  valued at \$648,880.

The improvement in revenue and profitability was due to a rapidly increasing acceptance and use of columbium as an essential metal, to a disciplined market and a general firming of prices on world markets. At the same time the efficiency of the Company's patented concentration process was gradually improved.

We estimate that consumption of columbium pentoxide has increased from 12 million

pounds in the year 1968 to 19 million pounds in 1969. Consumption could be over 25 million pounds in the year 1970.

During the 1970 fiscal year, your Company plans to produce 4.5 million pounds of columbium pentoxide, an increase of 1.5 million pounds over the 1969 fiscal year. At the present rate of operations and considering the trend towards higher prices, a substantial rise in profit is forecast for the 1970 fiscal year. Volume of production achieved in the second quarter will result in a net profit substantially higher than that obtained in the first quarter.

Since the 1969 year end, a new labour agreement was signed, in force to November, 1972.

St. Lawrence Columbium also gives its shareholders a unique opportunity to share in numerous exploration and development programs covering a variety of other metals. During 1969, the Company continued its efforts to broaden the scope of its activities in other mining areas. More extensive details on the exploration projects and other interests of your Company are included in this report.

St. Lawrence Columbium has played a pioneering role in providing for the first time an adequate source of supply of columbium, the properties and the technical advantages of which have induced rising consumption. Columbium is the answer to many needs, newly created in this era of complex and advanced industrial technology. The production of columbium concentrates opens for your Company avenues of expansion into other columbium products.

With the continuing support of our shareholders and the loyal efforts of our employees, management looks ahead to 1970 and future years not only with confidence but with a sense of optimism.

On behalf of the board,  
J.J. Gourd,  
President

# OPERATIONS

From an average monthly milling rate of 30,000 tons in the fiscal year 1968, the tonnage was gradually increased to a monthly average of 34,600 tons for the first half and 44,500 tons for the second half of the fiscal year 1969. Production of columbium pentoxide amounted to 3,059,000 pounds, an increase of 52% over the 2,006,000 pounds produced during the fiscal year 1968.

Production for the current fiscal year is scheduled at 4.5 million pounds of columbium pentoxide in view of the attainment of the current monthly milling rate of 60,000 tons.

During the year extensive efforts were directed to bringing the underground operation to the stage that permitted these increases in monthly tonnages. A third level was opened, lateral development work done to gain access to the two main orebodies and development work carried out to bring these orebodies into production. Development statistics for the last two years follow:

	Fiscal 1969	Fiscal 1968
Drifts 10' x 12' or larger .....	3,934 ft.	1,432 ft.
Sub-level drifts and cross-cuts .....	2,954 ft.	2,085 ft.
Raises .....	2,428 ft.	2,103 ft.

The mining sequence was also accelerated to obtain for the mine the needed flexibility. During the year, reserves of drilled ore above

the 1,000 ft. level ready to blast were built up and reserves of broken ore were increased. It is now estimated that more than 1.5 million tons of ore are fully developed.

Diamond drilling was done during the year to better define, above the 1,000 ft. level the orebodies currently in production. This drilling permitted an increase in ore reserves, after extraction of 475,201 tons in fiscal year 1969, from 2,500,000 tons as of October 1, 1968, grading 0.48%  $\text{Cb}_2\text{O}_5$ , to 3,125,000 tons as of October 1, 1969, grading 0.487%  $\text{Cb}_2\text{O}_5$ . Drilling has also outlined other ore zones parallel to the ones currently mined.

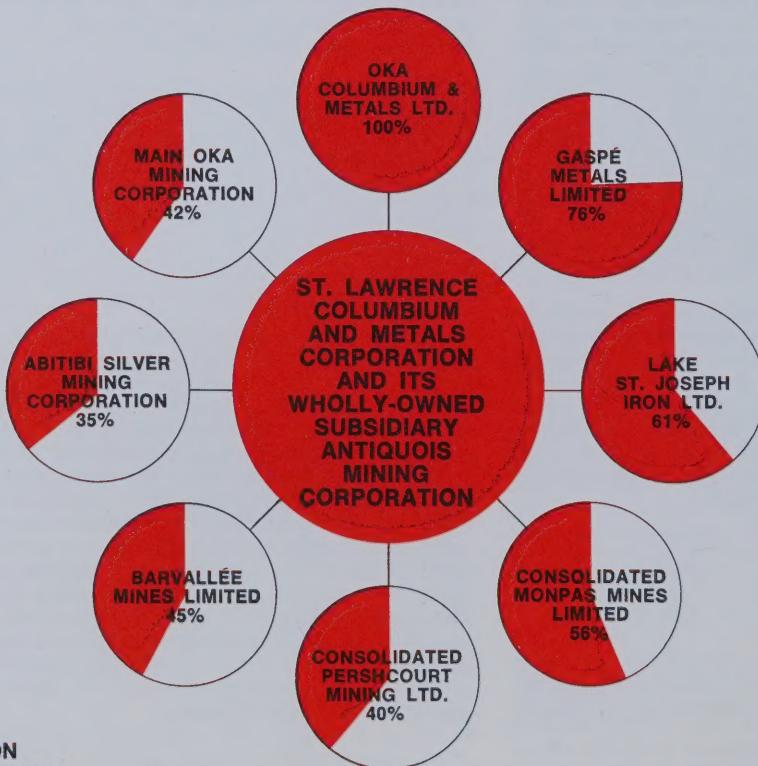
The depth extensions of the currently mined orebodies have also been explored by some 6,000 ft. of diamond drilling which, with previously drilled holes, has enabled the calculation of drill proven tonnage of more than 2,000,000 tons of ore grading 0.544%  $\text{Cb}_2\text{O}_5$ , a 15% higher grade than the ore reserves above the 1,000 ft. level, which confirm the trend for the columbium content of the ore to increase at depth. All indications are to the effect that in the second thousand feet of depth at least the same tonnage of ore as in the first thousand feet will be proven, which would mean sufficient reserves in this area to assure continuity of the Company's operation at the present milling rate for the next 12 years. Drilling is continuing.

## COMPARATIVE SUMMARY

	FISCAL YEARS ENDED SEPTEMBER 30				
	1969	1968	1967	1966	1965
Tons milled .....	475,201	360,194	369,642	406,698	383,553
Lbs. of $\text{Cb}_2\text{O}_5$ produced .....	3,059,052	2,005,989	2,368,225	2,647,667	2,203,985
Revenue from production .....	\$3,107,514	1,966,937	2,799,982	3,188,114	2,328,638
Operating costs .....	\$2,450,469	1,614,581	2,170,411	1,928,236	1,591,744
Administrative and selling expenses, interest and mining taxes .....	\$ 219,464	228,187	286,771	321,046	282,809
Profits before depreciation and amortization .....	\$ 437,580	124,169	342,799	929,259	454,495
Depreciation and amortization .....	\$ 332,220	256,511	323,505	474,964	—
Net profit for the year .....	\$ 105,360	(132,342)	19,294	454,295	454,495

No charge for depreciation was made in the 1965 financial statements. In 1966 an amount of \$602,952 covering depreciation for 1962 to 1965 was charged in a lump amount direct to surplus.

## COMPANIES AFFILIATED WITH ST. LAWRENCE COLUMBIUM AND METALS CORPORATION



### SHARE CAPITALIZATION OF AFFILIATED COMPANIES

#### OKA COLUMBIUM & METALS LTD.

Authorized Capital:  
5,000,000 common shares  
Issued: 2,500,007 shares

#### GASPÉ METALS LIMITED

Authorized Capital:  
5,000,000 common shares  
Issued: 1,966,009 shares

#### LAKE ST. JOSEPH IRON LTD.

Authorized Capital:  
10,000,000 common shares  
Issued: 3,333,336 shares

#### CONSOLIDATED PERSHCOURT MINING LTD.

Authorized Capital:  
5,000,000 common shares  
Issued: 3,110,938 shares  
Shares listed: Canadian Stock Exchange

#### BARVALLÉE MINES LIMITED

Authorized Capital:  
4,000,000 common shares  
Issued: 2,980,007 shares  
Shares listed: Canadian Stock Exchange

#### MAIN OKA MINING CORPORATION

Authorized Capital:  
3,000,000 common shares  
Issued: 2,050,007 shares

#### CONSOLIDATED MONPAS MINES LIMITED

Authorized Capital:  
5,000,000 common shares  
Issued: 1,900,008 shares

#### ABITIBI SILVER MINING CORPORATION

Authorized Capital:  
3,000,000 common shares  
Issued: 750,003 shares

# EXPLORATION INVOLVEMENTS, OTHER INTERESTS

Shareholders of St. Lawrence Columbium may appreciate, together with a brief report on exploration activities, summary information on various companies affiliated with it.

The interests in these affiliated companies held, either directly by St. Lawrence Columbium or indirectly through its wholly-owned subsidiary, Antiquois Mining Corporation, are shown in the accompanying chart. Antiquois acts as a holding/financing/management vehicle for St. Lawrence Columbium in respect of most exploration interests other than the Oka columbium properties.

**Oka Columbium & Metals Ltd.** holds a property consisting of 815 acres located within the favourable Oka complex and adjoining the 1,282 acre property of St. Lawrence Columbium. Drilling conducted in 1969 has returned wide and well mineralized intersections confirming the high potential of the property. Additional drilling will be needed to permit an ore reserve estimate which will be undertaken in due time.

**Main Oka Mining Corporation** holds a property of 403 acres also adjoining St. Lawrence Columbium's property. Exploration work has been concentrated on an ore zone extending from St. Lawrence Columbium's property into the Main Oka property. This ore zone is easily accessible from the present underground workings. 1,000,000 tons of ore grading 0.51%  $\text{Cb}_2\text{O}_5$  have been drill proven.

**Consolidated Pershcourt Mining Ltd.** holds a silver/zinc property covering 800 acres in Barraute Township, near Val d'Or, Northwestern Quebec. Drilling conducted in 1968 and 1969 confirmed the continuity of the silver/zinc mineralized zone. An engineer's report, bearing on the properties of Consolidated Pershcourt and Abitibi Silver and based on all results available was prepared in 1969 by G. H. Dumont, Eng., consulting engineer. In this report, ore reserves after dilution are summarized as follows:

	Tons	Ounces Silver	% Zinc	Average Mining width ft.
Drill indicated ore	4,038,144	2.39	2.45	27.5
Possible ore .....	1,079,259	2.57	2.32	23.3
Total .....	5,117,403	2.43	2.42	26.6

The net smelter return of the ore is estimated by Mr. Dumont at \$6.25 per ton of ore, using a value of 15.5¢ per pound for zinc and \$2.10 per ounce for silver. Mining and milling costs are estimated at \$4.75 per ton based on a milling rate of 1,500 tons per day.

Mr. Dumont is of the opinion that there is a good possibility of enlarging reserves and locating other high grade ore shoots through closer drilling from underground workings. He recommends underground exploration and development work.

**Abitibi Silver Mining Corporation** holds a silver/zinc property covering 3,000 acres and adjoining the property of Consolidated Pershcourt. Diamond drilling has been concentrated on the known extension of the mineralized zone of Consolidated Pershcourt into the Abitibi Silver property. G. H. Dumont, Eng., consulting engineer, summarizes reserves after dilution as shown in the following table.

The net smelter return of the ore is estimated by Mr. Dumont at \$6.93 per ton of ore, using a value of 15.5¢ per pound for zinc and \$2.10 per ounce for silver. Assuming that the Abitibi Silver property would be mined jointly with the Consolidated Pershcourt orebody, operating cost is estimated by Mr. Dumont at \$4.75 per ton based on a combined milling rate of 1,500 tons per day.

	Tons	Ounces Silver	% Zinc	Average Mining width ft.
Drill indicated ore	1,756,674	3.35	1.91	24.0
Possible ore .....	143,139	3.50	2.40	14.5
Total .....	1,899,813	3.36	1.95	23.3

**Barvallée Mines Limited** holds a copper prospect, adjoining the Vendôme Mines Ltd. orebody, covering 1,600 acres in Fiedmont Township, Northwestern Quebec.

Diamond drilling prior to 1969 outlined two well mineralized ore lenses containing 200,000 tons grading over 5.2% zinc, 1.2% copper and 1.3 oz. silver per ton. Barvallée Mines also holds two other copper prospects, one of 1,112 acres in Louvicourt Township, and the other totalling 1,720 acres in Bourlamaque Township, both in Northwestern Quebec.

During 1969, geophysical surveys were conducted on the Louvicourt, Bourlamaque and Fiedmont properties, also diamond drilling was done on the Bourlamaque and Fiedmont properties. Favourable zones for future exploration were indicated from this work.

**Gaspé Metals Limited** holds a 441-acre copper prospect adjoining the 11,000 ton-per-day Gaspé Copper Mines Ltd. operation of Noranda Mines Ltd. in Holland Township, Gaspé Peninsula. The favourable porphyry formation has been intersected by drilling and a recent geological and exploration assessment prepared by Dr. R. Assad, Eng., economic geologist, concludes good possibilities exist of locating mineralization similar to that encountered on the neighbouring property. Gaspé Metals plans to proceed with the exploration program recommended by Dr. Assad.

**Consolidated Monpas Mines Limited** holds a copper prospect under option to Quebec Mining Exploration Company (SOQUEM) consisting of a total of 14,860 acres in Duverny and Landrienne Townships, Northwestern Quebec. Under the main features of the agreement, SOQUEM bound itself to spend \$25,000 in exploration work on the property

during 1969—which it did—and has the option to keep its rights for two additional years provided it spends a minimum of \$25,000 per year. Following such two years, SOQUEM may hold its option for a further two years by spending \$50,000 per year and Consolidated Monpas can maintain its interest as mentioned below, provided it spends \$50,000 in each year of such two-year period.

If and when a total amount of \$275,000 has been spent (\$175,000 by SOQUEM and \$100,000 by Consolidated Monpas) then a new company may be formed to acquire these mining claims for shares of its capital stock; the respective ownership interest in this new company will be SOQUEM 48% and Consolidated Monpas 52%. Financing of this new company would be provided by Consolidated Monpas and SOQUEM on the basis of their respective interests.

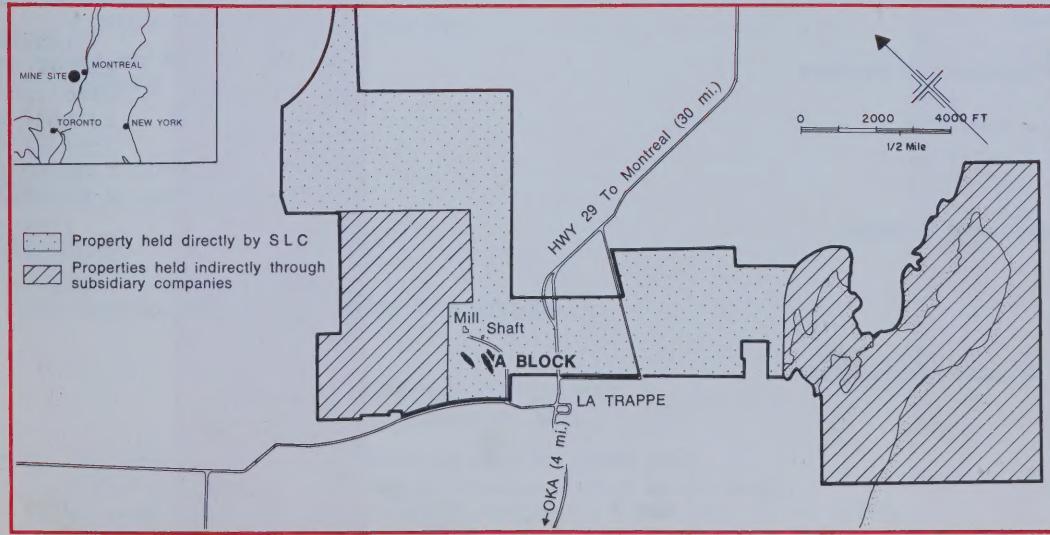
**Lake St. Joseph Iron Ltd.** is the owner of 73 patented mining claims covering an area of about 6.5 miles long and up to 1.5 miles wide in the Lake St. Joseph area of Northwestern Ontario, near the Steep Rock Iron Mines Ltd. deposits. Exploration work was carried out on this property by a major Canadian steel producer with which an exploration agreement was reached in 1968.

This work included geophysical surveys and sampling of trenches. Samples were collected for grade and magnetite determinations as well as for other laboratory test work. The results have confirmed the original estimate made by Lake St. Joseph of 240,000,000 tons grading 35% iron available by open pit mining methods. The steel producer has declared its intention to continue exploration of the property.

**Paska-Kowkash iron properties.** St. Lawrence Columbium owns a total of 41 patented claims located in Paska and Kowkash Townships, Northwestern Ontario, totalling 1,640 acres and on which two magnetite deposits grading over 25% iron minable by open pit methods have been located. These claims are near the Bralorne Can-Fer Resources Limited deposit which is under lease to The Algoma Steel Corporation Limited. St. Lawrence Columbium follows closely the developments in this area, which could eventually justify resumption of exploration on these properties.

**Anaconda Iron Ore (Ontario) Limited.** St. Lawrence Columbium owns 60,000 shares of Anaconda Iron Ore, being 2% of the issued shares. In accordance with the purchase agreement between Anaconda and the vendors of the property, the latter have the right to name two members of the board of directors of Anaconda Iron Ore to represent the minority interests including St. Lawrence Columbium. These two members are presently the president and vice-president and general counsel of St. Lawrence Columbium. In anticipation of bringing the property into production, Anaconda has done diamond drilling, has built an access road and a pilot plant and has carried out a great deal of the preliminary work.

#### COLUMBIUM PROPERTIES OF ST. LAWRENCE COLUMBIUM AND METALS CORPORATION



# BALANCE SHEET

AS AT SEPTEMBER 30, 1969

SEPTEMBER 30

	ASSETS	1969	1968
<b>CURRENT ASSETS:</b>			
Cash		\$ 78,567.70	\$ 71,592.64
Receivable less Reserve for Bad Debts		451,831.72	215,022.68
Special Refundable Tax		3,235.60	—
Finished Products at the Net Estimated Selling Price		75,667.73	47,770.55
Mining Supplies at Cost		187,584.36	143,589.04
Prepaid Expenses		3,249.58	5,999.76
		800,136.69	483,974.67
Special Refundable Tax:		—	16,204.72
<b>DEFERRED:</b>			
Interest		—	124.71
Pre-Production Expenses on Oka Properties at Cost less Amounts Written Off		340,648.83	340,648.83
Development Expenses on Other Properties		67,206.40	67,206.40
		407,855.23	407,979.94
<b>INTEREST IN MINING COMPANIES:</b>			
Shares at Cost (No Quoted Market Value)		973,850.38	973,850.38
Advances		312,670.59	290,060.10
		1,286,520.97	1,263,910.48
<b>FIXED ASSETS AT COST:</b>			
Land and Buildings		914,651.40	911,853.89
Shaft, Machinery, Equipment and Furniture		3,156,112.27	2,954,271.93
Less: Accumulated Depreciation		4,070,763.67	3,866,125.82
Mining Properties		1,803,873.36	1,471,653.46
		2,266,890.31	2,394,472.36
		1,945,857.72	1,945,857.72
		4,212,748.03	4,340,330.08
		7,058.19	7,058.19
Incorporation and Organization Expenses:		\$6,714,319.11	\$6,519,458.08

Approved on behalf of the Board of Directors:

J.-J. Gourd, Director

J. Monette, Director

SEPTEMBER 30

	LIABILITIES	1969	1968
<b>CURRENT LIABILITIES:</b>			
Accounts and Wages Payable and Accrued Charges	\$ 481,495.11	\$ 273,052.41	
Mortgage Secured Loan 8% Interest, Quarterly Instalments Maturing within One Year	45,000.00	45,000.00	
Instalment Due Next April 1 on Purchase of Assets (No Interest)	45,000.00	45,000.00	
Instalment Due Next September 30 on Note Payable 6½% Interest	28,941.61	28,941.61	
	600,436.72	391,994.02	
<b>OTHER LIABILITIES:</b>			
Mortgage Secured Loan 8% Interest, Payable by Quarterly Instalments of \$11,250.00 each	146,250.00	191,250.00	
Instalments on Purchase of Assets (No Interest)	50,000.00	95,000.00	
Instalments on Note Payable 6½% Interest	28,941.61	57,883.22	
Loan from Directors 6½% Interest, Due January 1, 1974	197,850.17	197,850.17	
	\$ 423,041.78	\$ 541,983.99	
	SHAREHOLDERS' EQUITY		
<b>CAPITAL STOCK:</b>			
Authorized:			
5,000,000 Shares \$1.00 Par Value Each	\$5,000,000.00	\$5,000,000.00	
<b>Issued and Paid Up: (Note)</b>			
3,048,716 Shares	\$3,048,716.00	\$3,048,716.00	
Premium	456,800.00	456,800.00	
	3,505,516.00	3,505,516.00	
<b>CAPITAL SURPLUS:</b>	1,947,954.34	1,947,954.34	
<b>EARNED SURPLUS:</b>	237,370.27	237,370.27	
	5,690,840.61	5,585,480.67	
	\$6,714,319.11	\$6,519,458.08	
Submitted with our report of this day			
DENIS, DESMARAIS, HOULE, MOONEY ET ASSOCIÉS			
	NOTE TO FINANCIAL STATEMENTS		
	AS AT SEPTEMBER 30, 1969		
Note - The following options to purchase shares of the capital stock of the Company were outstanding: to various employees 27,300 shares at a price of \$2.50 per share all expiring on October 1, 1971 and 20,000 shares at a price of \$2.50 per share all expiring on October 1, 1974.			

# PROFIT AND LOSS STATEMENT

## STATEMENT OF EARNED SURPLUS

YEAR ENDED SEPTEMBER 30

### PROFIT AND LOSS STATEMENT

#### REVENUE FROM PRODUCTION:

Less:

Mine Operating Cost .....

Administrative and Selling Expenses .....

Financial Expenses .....

Outside Exploration .....

	1969	1968
REVENUE FROM PRODUCTION:	\$3,107,514.42	\$1,966,937.23
Less:		
Mine Operating Cost .....	2,450,469.35	1,614,581.28
Administrative and Selling Expenses .....	177,778.31	184,986.84
Financial Expenses .....	40,770.61	42,987.56
Outside Exploration .....	918.31	212.88
	<b>2,669,934.58</b>	<b>1,842,768.56</b>
Less:		
Depreciation on Buildings and Equipment .....	437,579.84	124,168.67
	<b>332,219.90</b>	<b>256,511.35</b>
<b>NET PROFIT FOR THE YEAR (LOSS)</b>	<b>\$ 105,359.94</b>	<b>\$ (132,342.68)</b>

### STATEMENT OF EARNED SURPLUS

#### BALANCE AS AT PREVIOUS SEPTEMBER 30

Add:

Adjustment of Quebec Mining Taxes for prior year .....

Add:

Net Profit for the Year (Loss) .....

#### BALANCE AS AT SEPTEMBER 30

\$ 132,010.33	\$ 263,458.22
—	894.79
105,359.94	(132,342.68)
<b>\$ 237,370.27</b>	<b>\$ 132,010.33</b>

# STATEMENT OF SOURCE AND APPLICATION OF FUNDS

YEAR ENDED SEPTEMBER 30

## FUNDS PROVIDED:

### Operating Results:

#### Consisting of:

Net Profit (Loss) for the Year	.....	.....
Depreciation Charges Not Requiring Cash Outlays During the Year	.....	.....

Issuance of Company's Shares .....

Mortgage Secured Loan, 8% Interest .....

Refund of Special Income Tax .....

Refund of Mining Duties of Prior Year .....

1969	1968
0	0
\$ 105,359.94	\$ (132,342.68)
332,219.90	256,511.35
437,579.84	124,168.67
	283,000.00
	270,000.00
	3,009.89
	894.79
437,579.84	681,073.35
204,637.85	89,018.14
22,610.49	281,250.00
118,941.61	2,805.53
346,189.95	158,238.73
91,389.89	531,312.40
\$ 437,579.84	149,760.95
	\$ 681,073.35

## FUNDS APPLIED:

Additions to Buildings and Equipment .....

Purchase of Shares of a Subsidiary .....

Advances to Subsidiary Companies .....

Long Term Debts .....

Increase in Working Capital .....

## AUDITORS' REPORT

To the Shareholders of St. Lawrence Columbium and Metals Corporation.

We have examined the balance sheet of St. Lawrence Columbium and Metals Corporation as at September 30, 1969 and the statements of profit and loss and earned surplus for the year ended on that date. Our examination included a general review of the accounting procedures and such tests of accounting records and other supporting evidence as we considered necessary in the circumstances.

In our opinion, the accompanying balance sheet, statements of profit and loss and earned surplus and the note attached to financial statements, present fairly the financial position of the Company as at September 30, 1969 and the results of its operations for the year ended on that date, in accordance with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

Montreal, February 6, 1970.

Denis, Desmarais, Houle, Mooney et Associés,  
Chartered Accountants.

# WORLD COLUMBIUM MARKET

The growth of St. Lawrence Columbium and Metals Corporation is in large part due to its ability in making columbium readily available to the industry and to the fact that this metal has found wide applications in all sectors ranging from the space industry to the more conventional construction industry.

**In the aerospace industry**, columbium has already been proven a key material in the successful flights of the Apollo spacecraft: a columbium alloy was used for the building of the Apollo module. Columbium is also used in the tubing of liquid cooling thrust chambers propelling spacecraft which are often protected with columbium-based plates to insure against burn-up during re-entry into the earth's atmosphere. It is mainly because of its resistance to high temperatures that columbium is enjoying a growing demand in the aerospace industry.

**In the aircraft industry**, for the same reason, increased use is being made of columbium alloys for nose cones and leading edges of hypersonic flight vehicles and for turbine rotary blades. The leader in this field is Inconel 718 containing 5% columbium, a nickel-base alloy which keeps its resistance at temperatures as high as 790°C.

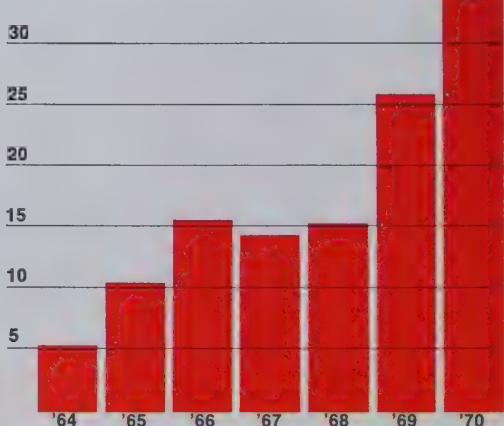
**The nuclear field** looks to columbium as the solution to the problems related to the fast breeder reactor; already pumps have been built using columbium alloy to carry the highly corrosive molten salts used as a cooling agent. Furthermore, because of its resistance to corrosion and its low nuclear cross section, columbium is considered as a cladding agent and a structural element for this type of reactor.

**In the chemical industry**, columbium is favoured because of its high resistance to corrosion. Immediate uses include: liners for crucibles, fortification of ducting and transfer equipment, and containers of highly corrosive acids. Columbium is gaining in acceptance



Platinum-clad columbium anodes are used to protect the underwater sections of ship hulls against corrosion.

POUNDS OF PYROCHLORE CONCENTRATES  
35 million



WORLD PRODUCTION OF PYROCHLORE\* CONCENTRATES

\* Pyrochlore: A complex oxide containing generally over 50% of columbium pentoxide

over other metals because of its performance under day-to-day industrial conditions and its lower cost.

**The electric power industry** is another sector where columbium is finding new applications. Columbium, a metal which offers very little resistance to electrical current at low temperature (-450°F), has allowed scientists to predict that a cable of this metal with a diameter of less than 20 inches could be built to handle 10,000 MVA up to 345 KV, which would be more than sufficient to satisfy the present daily needs of the City of New York. Superconducting magnets incorporating columbium are now viewed by many scientists as a promising tool to produce electric power. In fact not only does the superconductivity of columbium assure a number of outlets but this particular characteristic should open up a substantial market in the years to come.

**In pipeline fabrication**, columbium has benefited largely from the booming growth experienced since 1968. Columbium low-alloy steels are often specified for these tubes since they offer additional strength and enhance weldability.

**The construction industry** uses advantageously columbium high-strength low-alloy steels because they offer not only higher strength for a given weight, but again their weldability plays an important role. Buildings, bridges (Pont-des-Îles, built in Montreal for Expo 67, Severn Bridge in England) are some examples.

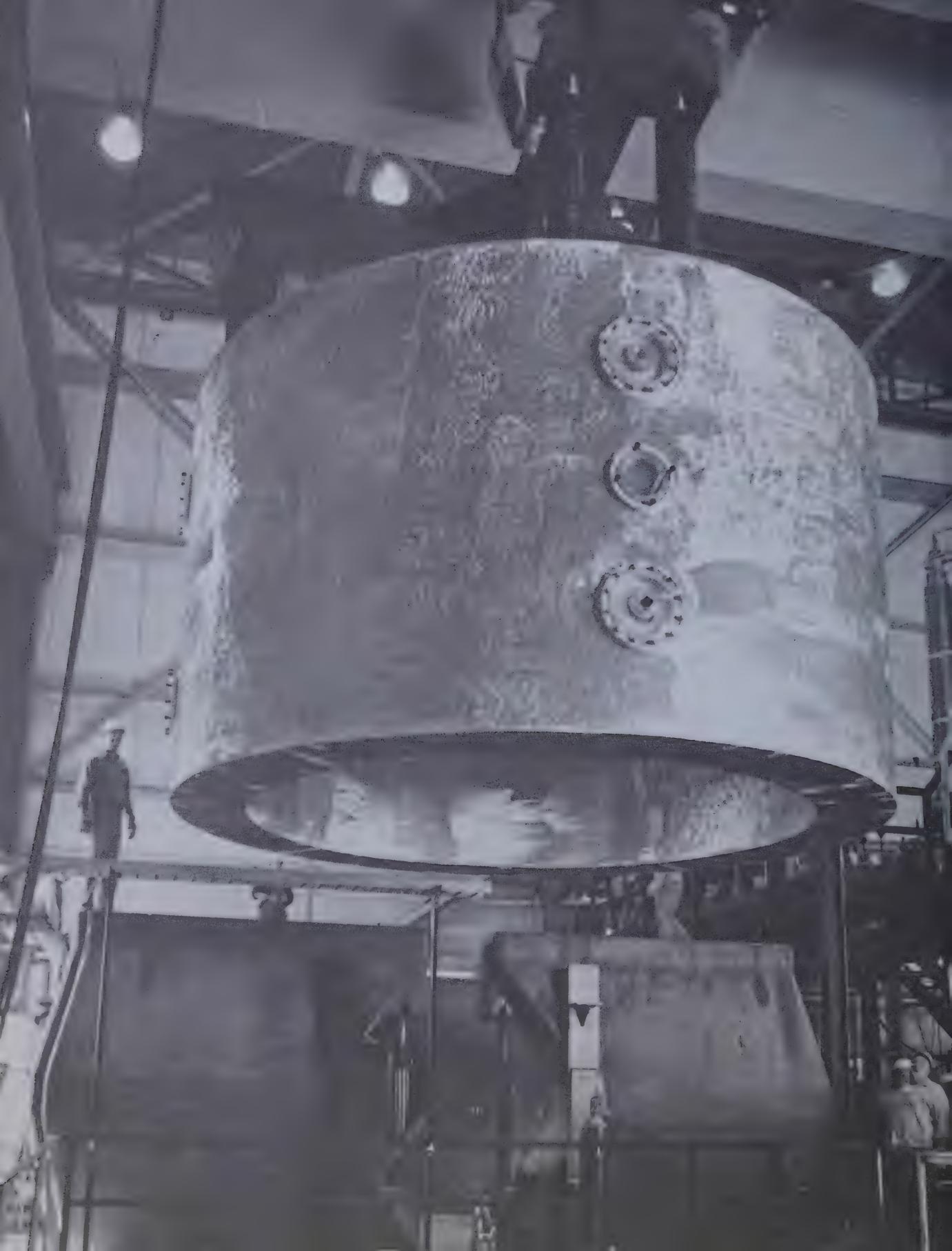
**Shipbuilding** is another sector of the economy which makes extensive use of columbium alloy steels. Columbium-treated steel, because of its weldability and strength-to-weight ratio, permits significant gains in dead-weight; ships built with columbium-treated steel can now be registered in Lloyd's Register of London. A Swedish company has specialized successfully in the production of this type of steel for the shipbuilding industry.

**In the automotive industry**, another Swedish company has recently developed a new columbium alloy steel that opens new designing possibilities. This alloy is presently used by two Swedish automakers and the producer, Fagersta, estimates that over 50,000 tons of this new columbium alloy—which offers high strength-to-weight ratio, good cold workability, machinability, and weldability—will be produced each year by it alone.

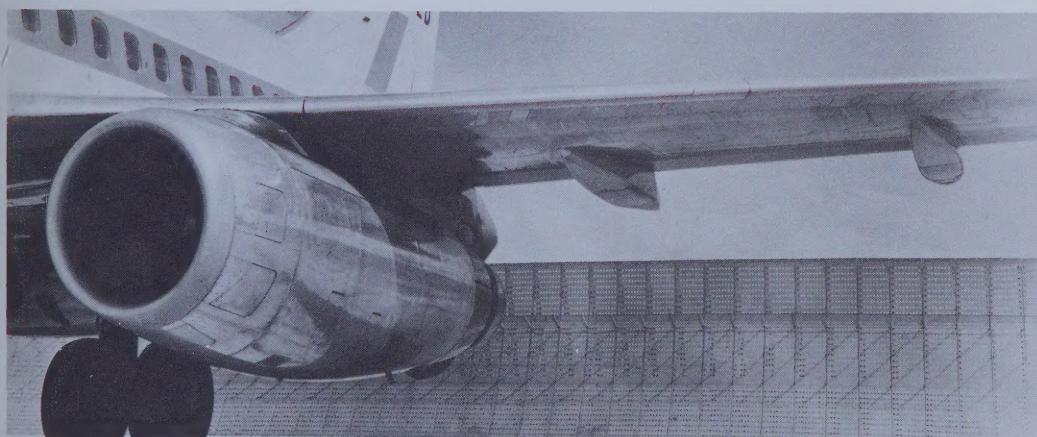
These numerous outlets, and other developments in the making, lead to the expectation that consumption of columbium pentoxide, compared with an estimated 12,000,000 pounds in 1968, will be more than 25,000,000 pounds in 1970.



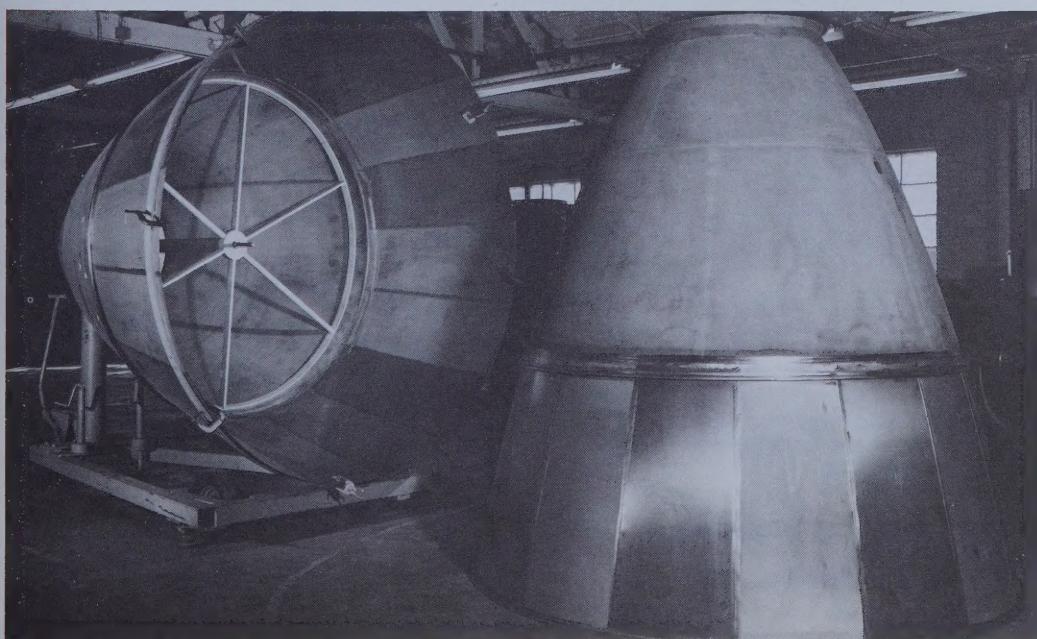
Construction of some high-strength structural steel angles for microwave towers makes use of columbium as an alloy agent.



A huge superconducting magnet which weighs 110 tons is shown at left—a major new use for columbium.



Protection fences that can withstand the blast from a jet engine are fabricated of steel sheet containing columbium.



Shown at left, the Apollo service module fabricated of columbium and titanium.

This report is not intended to be a solicitation or an offer to buy or sell shares of the Company and is issued only for the purpose of keeping its shareholders informed.

All technical information is based on published sources as well as other sources which the Company considers to be reliable.

*Sur demande, il nous fera plaisir de vous adresser l'édition française de ce rapport.*

Photographs Courtesy of :  
Argonne National Laboratories  
Engelhard Minerals & Chemicals Corporation  
Fansteel Inc.  
Inland Steel Company



